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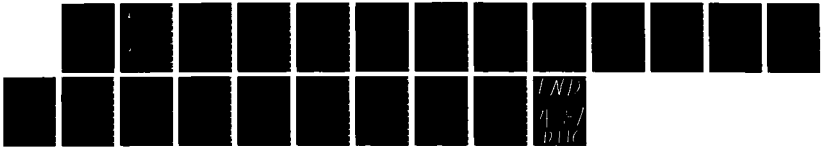

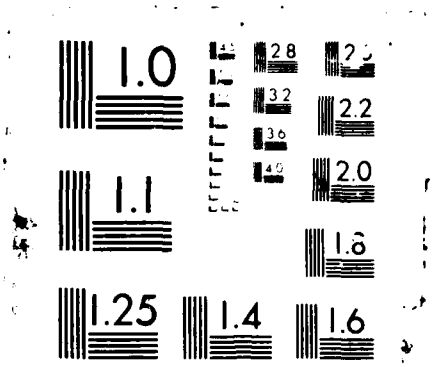
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.8
3.2
3.6
4.0

TECHNICAL REPORT RD-DE-87-3

SDCNCC - A MICROCOMPUTER BASED CODE FOR FISCAL STATUS CHARTS

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MARCH 1987

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19 ABSTRACT (Continue on reverse if necessary and identify by block number)

SDCNCC is a microcomputer based code for the generation of graphs and charts to present fiscal information. The program incorporates a line graph with a table of the input data plotted on a single chart.

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I. INTRODUCTION

The SDCNCC code is a PC based computer program created to generate graphic charts reporting the status of funds received by and/or through The Strategic Defense Command (SDC). The format of the presentation chart is that form used by the SDC in reporting; there are, however, limited options available to allow some degree of versatility to other reports. The code is written in Microsoft FORTRAN and uses Microcompatibles PLOTMATICS for communication with a Hewlett-Packard plotter.

The SDCNCC chart combines a table of numerical data that is to be tracked for each month of the fiscal year with a graphical representation. The code allows the eight parameters of interest to SDC to be tabulated and plotted. The types of data that are typically tracked by SDC are:

a. ANNUAL PROGRAM FUNDING - Funding budget for a project.

b. FUNDING RECEIVED - Funding received by the project.

c. PLANNED OBLIGATIONS - Funding that has been planned for obligation on a contract or for an in-house activity but has not actually been obligated.

d. ACTUAL OBLIGATIONS - Funds that have been transferred to a contractual or in-house activity against which charges may be made.

e. NON-CANCELABLE COMMITMENTS (NCC) Planned - Funds that will not be available for recovery from a contract or in-house project.

f. ACTUAL NCC - Funds that are not available for recovery from a contract or in-house project.

g. EXPENDED PLANNED - Represents the charges that are planned against obligated funds for a given period of time.

h. ACTUAL AMOUNT EXPENDED - Actual charges made against Obligated funds.

II. HARDWARE/SOFTWARE REQUIREMENTS

The SDCNCC computer code is compiled in Microsoft FORTRAN version 3.2. It is designed to run on a minimal IBM Personal Computer or PC compatible microcomputer with 256k of RAM and either monochrome or graphics monitor. The code is designed to produce a chart on a Hewlett-Packard plotter. Switches on the plotter should be set as follows:

2400 baud

8 bit word

no parity

Y/D switch set to D

US-A4 switch set to US.

An editor is required to create and modify the input files used by the program.

III. PRACTICAL CONSIDERATIONS AND COMMENTS

To avoid confusion in terminology, the following explanation of terms is provided: The computer code will plot eight data curves; each curve consists of up to twelve data points. The eight data curves are established by the SDC requirement; the twelve data points established by a desire to represent a full year, more than twelve time intervals, i.e. months, leads to very busy charts. In this report, the term curve will be used to represent the data points depicting the behavior of a given parameter with time. Data is entered into the program by time period, typically by month. That is, all eight data points for a given month are entered as a data set. Thus, the term data set consists of eight data points representing each of the family of eight curves at a point in time.

Any chart that attempts to represent as many as eight curves on a single chart can become very busy and confusing. The user must exercise judgement in the choice of line colors and line patterns used to simplify the chart as much as possible. The eight figures of merit typically presented in the SDCNCC chart consist of four planned actions and four actual actions, i.e., expensed plan and expensed actual. For a chart of this type, it is suggested that the planned events be represented by dashed lines, color coded to distinguish one from the other. The actual events can then be solid lines of corresponding colors thus limiting the line patterns involved.

IV. INPUT INSTRUCTIONS

A. General

The SDCNCC Code outputs data of the type discussed in Section I introduction, and in the format illustrated in Figure 1. This is the general form that is required for SDC financial status presentations.

B. Data Input File Form

A data file must be created as input into the SDCNCC Code. A typical data file is shown in Figure 2. The file must be in the exact form shown with the same general format of data and labels, although the actual heading names and the data entries may be different. Usually, the input data plotted verses the months of the year; however, the user can specify the desired labels here also. The program allows the user to track up to eight figures of merit verses twelve months of the year. The general form of the data input file is given below:

LINE NUMBER	LINE CONTENTS
1	CHART TITLE
2	CHART SUBTITLE
3	VERTICAL AXIS LABEL
4	BLANK LINE (divider)
5	LABEL FOR FIRST CURVE
6	LABEL FOR SECOND CURVE
7	LABEL FOR THIRD CURVE
8	LABEL FOR FOURTH CURVE
9	LABEL FOR FIFTH CURVE
10	LABEL FOR SIXTH CURVE
11	LABEL FOR SEVENTH CURVE
12	LABEL FOR EIGHTH CURVE
13	CURVE PEN NUMBERS
14	LABEL PEN NUMBER
15	LINE PATTERNS
16	LINE PATTERN LENGTHS

LINE NUMBER	LINE CONTENTS (CONTINUED)
17	PERCENTAGE FLAGS
18	MAXIMUM VALUE FOR VERTICAL AXIS
19	DATA SET LABEL (i.e., "OCT")
20	DATA SET (EIGHT DATA POINTS)
21	SAME AS 19
22	SAME AS 20
ETC.	ETC.

C. Line of Instruction Information

Specific information for each line of instruction is given below. For additional information, the user is encouraged to review the example data input file found in Figure 2.

LINE 1 - CHART TITLE

The CHART TITLE will be centered and written in bold letters at the top of the chart. The practical length for this line is 10 - 20 characters.

LINE 2 - CHART SUBTITLE

The CHART SUBTITLE will be centered and written below the CHART TITLE on the chart. It should also be 10 - 20 characters in length.

LINE 3 - VERTICAL AXIS LABEL

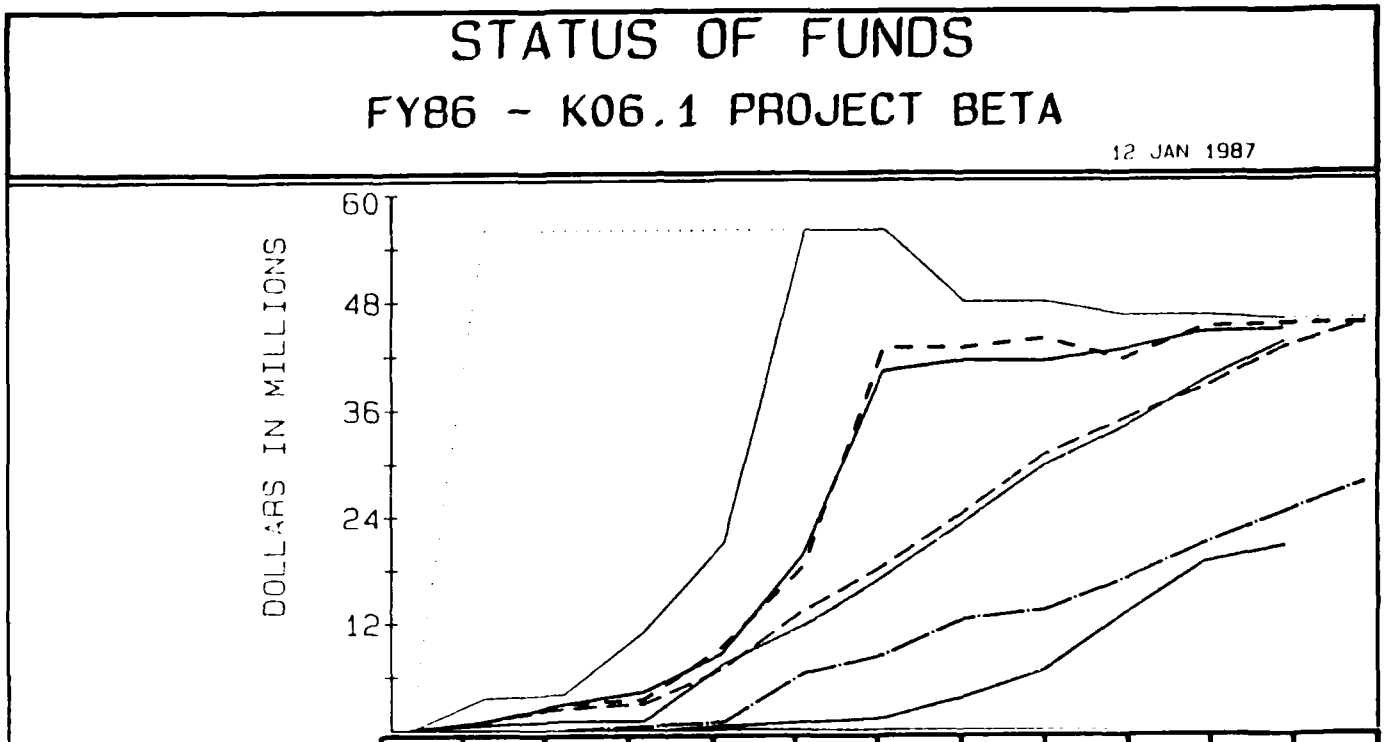
The VERTICAL AXIS LABEL is alpha-numeric text and should not be any longer than 20 characters. The practical length of the Y-axis label is 10 characters.

LINE 4 - BLANK LINE

This line serves as a divider between the title information and the input data.

LINES 5 - 12 - CURVE LABELS

These lines of information contain the labels for the data curves used in the chart. These will be written at the lower left side of the chart next to the corresponding data entries.



	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
ANNUAL PROGRAM	56.0	56.0	56.0	56.0	56.0	56.0	48.0	48.0	46.5	46.5	46.1	46.1
FUNDS RECEIVED ——	3.6	4.1	11.1	21.1	56.0	56.0	48.0	48.0	46.5	46.5	46.1	
OBLIGATION PLAN — —	1.0	3.0	3.5	9.5	18.5	43.0	43.0	44.0	41.7	45.3	45.6	45.6
ACTUAL OBLIGATION 98%	1.0	3.0	4.4	8.7	19.8	40.4	41.6	41.5	42.8	44.7	45.0	
NCC PLAN (ESTIMATED) — —	1.0	2.5	3.0	7.0	13.5	18.5	24.5	31.0	35.0	38.5	43.0	45.6
ACTUAL NCC ——	0.6	1.1	1.1	7.5	11.8	17.3	23.4	29.8	34.1	39.3	43.6	
EXPEND PLAN 53%	0.0	0.0	0.5	1.0	6.5	8.5	12.5	13.5	17.0	21.0	24.5	27.8
ACTUAL EXPEND 48%	0.0	0.0	0.0	0.5	1.0	1.4	3.8	6.8	13.1	18.9	20.7	

Figure 1. Sample format for SDC financial status.

```
STATUS OF FUNDS
FY86 - K06.1 PROJECT BETA
    DOLLARS IN MILLIONS

ANNUAL PROGRAM
FUNDS RECEIVED
OBLIGATION PLAN
ACTUAL OBLIGATION
NCC PLAN(ESTIMATED)
ACTUAL NCC
EXPEND PLAN
ACTUAL EXPEND
5  5  6  6  7  7  8  8
1  1  2  2  3  3  4  4
1  7  2  7  3  7  4  7
.7 1. 2. 1. 2. 1. 3. 1.
0  0  0  2  0  0  2  2
60.00
OCT
56.0 ,  3.6 ,  1.0 ,  1.0 ,  1.0 ,  0.6 ,
NOV
56.0 ,  4.1 ,  3.0 ,  3.0 ,  2.5 ,  1.1 ,
DEC
56.0 , 11.1 ,  3.5 ,  4.4 ,  3.0 ,  1.1 ,  0.5 ,  0.0
JAN
56.0 , 21.1 ,  9.5 ,  8.7 ,  7.0 ,  7.5 ,  1.0 ,  0.5
FEB
56.0 , 56.0 , 18.5 , 19.8 , 13.5 , 11.8 ,  6.5 ,  1.0
MAR
56.0 , 56.0 , 43.0 , 40.4 , 18.5 , 17.3 ,  8.5 ,  1.4
APR
48.0 , 48.0 , 43.0 , 41.6 , 24.5 , 23.4 , 12.5 ,  3.8
MAY
48.0 , 48.0 , 44.0 , 41.5 , 31.0 , 29.8 , 13.5 ,  6.8
JUN
46.5 , 46.5 , 41.7 , 42.8 , 35.0 , 34.1 , 17.0 , 13.1
JUL
46.5 , 46.5 , 45.3 , 44.7 , 38.5 , 39.3 , 21.0 , 18.9
AUG
46.1 , 46.1 , 45.6 , 45.0 , 43.0 , 43.6 , 24.5 , 20.7
SEP
46.1 , -10. , 45.6 , -10. , 45.6 , -10. , 27.8 , -10.
```

Figure 2. Example input file - project data.

LINE 13 - CURVE PEN NUMBERS

This line of information specifies the pen to be used to draw the chart for each data set. A total of eight integer numbers must be specified corresponding to each of the eight data sets; each of the numbers must be separated by at least one blank space. An example entry for line 13 is:

5 6 7 8 5 6 7 8

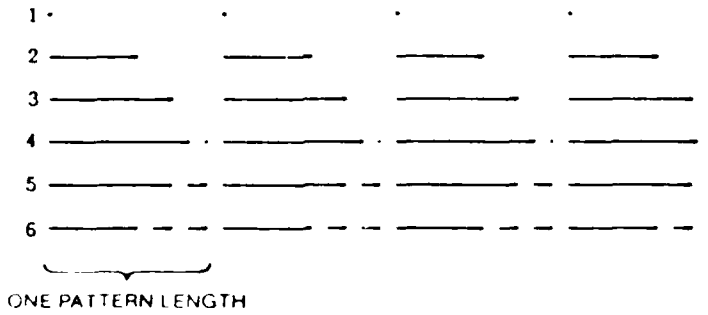
This example instructs the program to use pen "5" to draw the curve for the first data set, pen "6" for the second, etc. The actual color used is determined by the user not only by these specifications, but also by the arrangement of the pens in the plotter carousel. Wide pens usually work best.

LINE 14 - LABEL PEN NUMBERS

This line of information specifies the pen numbers that are to be used to write the curve labels that are input on LINES 5 - 12. Fine point plotter pens should be used for clarity of the plotted labels since the lettering is necessarily small. One should coordinate the color pen used for the labels, LINE 14, with the curve on the graph, LINE 13, for the corresponding data curve. These numbers are also input on the same line of the file as integers with two blanks between the values.

LINE 15 - LINE PATTERN TYPE SPECIFICATION

This line of information specifies the line types to be used in plotting the curves. Six line types are available ranging from solid lines to dotted lines. Illustrated below are the LINE PATTERN codes used for the six line patterns.



LINE 16 - LINE PATTERN LENGTH SPECIFICATION

This line of information specifies the line pattern length for each of the line patterns specified in LINE 15. This information specifies, for example, the relative length of dashes used in a dashed line. The user should review the user's guide for the plotter in use and, in particular, the primitive HPGL command LT. Recommended values to be used are as follows:

LINE PATTERN CODE		LINE PATTERN PARAMETERS
1		0.7
2		2.0
3		2.0
4		3.0
5		2.0
6		3.0
7	solid line	1.0

LINE 17 - PERCENTAGE FLAGS

This line of information sets the flags for the percentages that can be plotted with the labels named in LINES 5 - 12, plotted in the lower left of the chart, see Figure 1. A detailed explanation for setting these flags is found in the Appendix. Setting the value to zero indicates to the program not to calculate any percentage and not to put a value on the chart. The flags are input as eight integers on the same line with two spaces between the values.

LINE 18 - MAXIMUM VALUE FOR VERTICAL AXIS

This number is the maximum value of the vertical axis to be plotted on the chart. It should be equal to or larger than the largest number in the input data. It should be a number that is evenly divisible by 5 so that the data values of the vertical axis are even numbers that are pleasing.

LINE 19 - FIRST DATA SET LABEL

This is an alpha-numeric label to be placed on the horizontal axis above which the first data point in each of the eight curves is to be plotted. Typically this label denotes a point in time such as the month. These labels should be limited to three letters.

LINE 20 - FIRST DATA SET

This line contains the first value of data for each of the eight curves that corresponds to the curve labels entered on LINES 5 - 12. These eight values are the data for each heading that corresponds to the label input on LINE 19. For example, in the chart of Figure 1 these are the data entries for each heading for the month of October (OCT in Figure 1). The eight values are input on one line of the file separated by commas. If there is not a data value available for a particular heading, a negative number, equal in value to the value entered on LINE 19, should be input into that position. The program keys on a negative number as no value. The program will not input a value under the corresponding heading for which there is no number available and will not plot a number on the graph. This avoids the problem of the program plotting a zero for a number that is not yet available.

LINES 19 and 20 are then repeated up to eleven more times to complete the data sets for the data labels as entered on LINE 19 and that are associated with the curve labels entered on LINES 5 - 12.

V. EXECUTING THE PROGRAM

After the input data file has been generated and stored on disk and the plotter turned on, the SDCNCC program is run by typing "SDCNCC" following the system prompt. Figure 3 is a printout of the information appearing on the screen during a typical program execution. The program title logo initially appears on the screen along with the program prompt "STRIKE "ENTER" TO CONTINUE." The user strikes the "ENTER" or "RETURN" key to continue. The next prompt is of the form:

SPECIFY PLOTTING OPTION - 0,1,2,3

0 - FLAT-TOP OPTION

1 - END OF MONTH - ZERO INITIAL VALUE OPTION

2 - END OF MONTH - SPECIFIED INITIAL VALUE

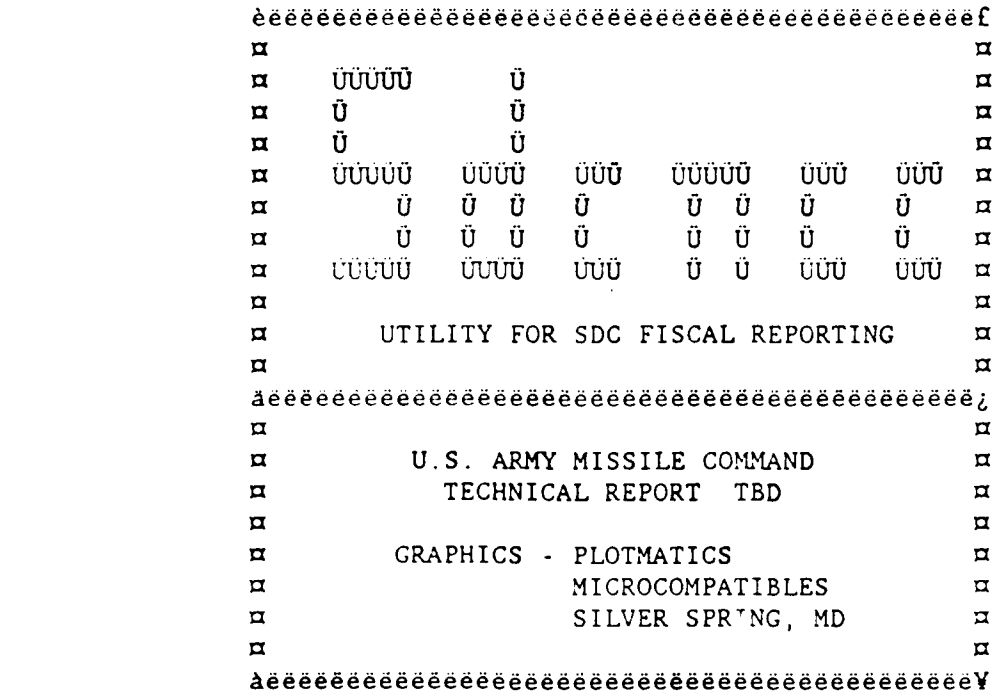
3 - MIDDLE OF MONTH OPTION

The program provides several options as to how the data curves are to be plotted. As previously stated, the code was designed to represent fiscal data on a monthly basis. This results in no subdivision within a month. Generally, the approach taken is one which the curve plotted reaches the specified value at the end of the month, options 0, 1, and 2. However, the slope of the line within the month does not represent the actual data on a daily basis. Option 3 specifies that the curve reaches the specified value centered within the chart space allotted for a given month.

The above logic allows a reasonable representation of the data at an adequate degree of resolution. A difficulty can arise with the first data set. For the first data set, typically at the beginning of a fiscal year, the funding may begin at zero on the first of the month but have achieved a non-zero value by month's end. If this be the case, Option 1 is provided to represent the data. Option 1, in effect, assumes an initial data point of zero for each curve. Alternatively, if the first data set represents a continuing project, it may not be appropriate to begin the chart at zero for each curve. In this case, Option 2 should be used to draw a horizontal line for the first month at the level specified in the data input file. In effect, Options 0 and 3 avoid this problem somewhat by assuming a single data point for any month including the first. Figure 4 illustrates each of the curve options.

The final prompt is "ENTER DATA FILE NAME" to which the user should respond by typing complete name of the input data file to include any extensions. For legibility and convenience, the name should be typed in upper case letters since this character string is affixed to the upper right corner of the chart in small lettering.

The program reads the input data file and displays the data on the screen, allowing the user to find errors that might occur. The code has no additional error checking features other than those "built in" features of the FORTRAN compiler.




```
 STRIKE "ENTER" TO CONTINUE

 SPECIFY PLOTTING OPTION - 0,1,2,3
   0 - FLAT-TOP OPTION
   1 - END OF MONTH - ZERO INITIAL VALUE OPTION
   2 - END OF MONTH - SPECIFIED INITIAL VALUE OPTION
   3 - MIDDLE OF MONTH OPTION
1
ENTER DATA FILE NAME
pro    PROJ.DAT
 THE TITLE        STATUS OF FUNDS
 THE SUBTITLE     FY86 - K06.1 PROJECT BETA
 Y-AXIS LABEL         DOLLARS IN MILLIONS
 LABEL #1      ANNUAL PROGRAM
 LABEL #2      FUNDS RECEIVED
 LABEL #3      OBLIGATION PLAN
 LABEL #4      ACTUAL OBLIGATION
 LABEL #5      NCC PLAN(ESTIMATED)
 LABEL #6      ACTUAL NCC
 LABEL #7      EXPEND PLAN
 LABEL #8      ACTUAL EXPEND
```

Figure 3. Monitor output during execution. (Sheet 1 of 2)

```
THE PENS TO BE USED FOR LINES ARE        5     5     6     6     7     7     8     8
THE PENS TO BE USED FOR LABELS ARE       1     1     2     2     3     3     4     4
THE LINE TYPES TO BE USED ARE            1     7     2     7     3     7     4     7
THE LINE PATTERN PARAMTETERS ARE        .7   1.0   2.0   1.0   2.0   1.0   3.0   1.0
PERCENTAGES FLAGS FOR DATA SETS          0     0     0     2     0     0     2     2

MAXIMUM VALUE IS      60.000
OCT
 56.000   3.600   1.000   1.000   1.000    .600    .000    .000
NOV
 56.000   4.100   3.000   3.000   2.500   1.100    .000    .000
DEC
 56.000  11.100   3.500   4.400   3.000   1.100    .500    .000
JAN
 56.000  21.100   9.500   8.700   7.000   7.500   1.000    .500
FEB
 56.000  56.000  18.500  19.800  13.500  11.800   6.500   1.000
MAR
 56.000  56.000  43.000  40.400  18.500  17.300   8.500   1.400
APR
 48.000  48.000  43.000  41.600  24.500  23.400  12.500   3.800
MAY
 48.000  48.000  44.000  41.500  31.000  29.800  13.500   6.800
JUN
 46.500  46.500  41.700  42.800  35.000  34.100  17.000  13.100
JUL
 46.500  46.500  45.300  44.700  38.500  39.300  21.000  18.900
AUG
 46.100  46.100  45.600  45.000  43.000  43.600  24.500  20.700
SEP
 46.100 -10.000  45.600 -10.000  45.600 -10.000  27.800 -10.000

***** DATA INPUT IS COMPLETE *****
```

Figure 3. Monitor output during execution. (Sheet 2 of 2)

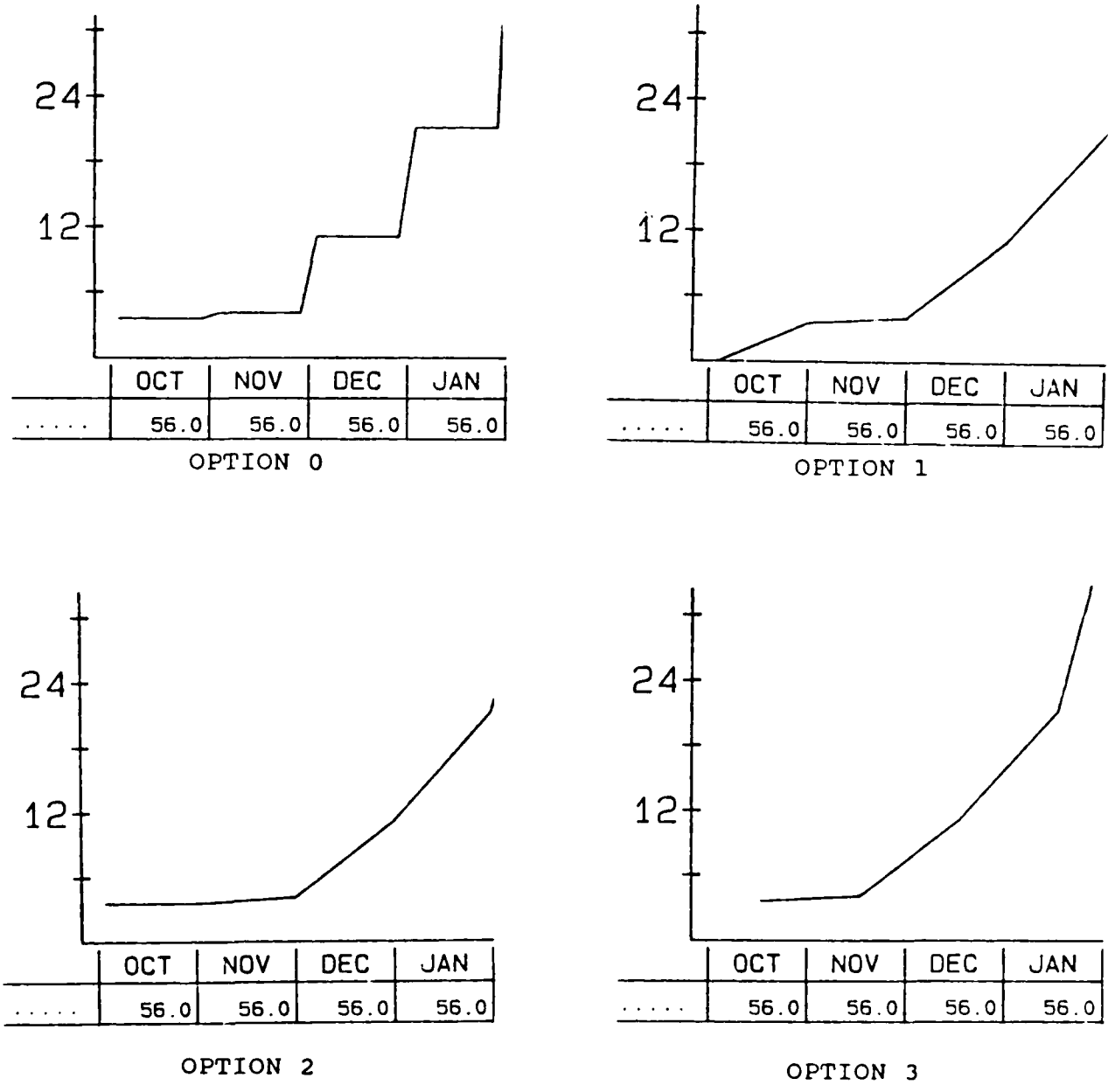


Figure 4. Chart curve options.

APPENDIX

SETTING THE PERCENTAGE FLAGS

APPENDIX

Setting The Percentage Flags

The information input on LINE 15 of the data file enables the user to display important percentage values on the chart. The percentages displayed in Figure 1 show the percentages of total funds received by the project that have been obligated and expended to date, and the planned expenditures to date. The method for setting the flags is somewhat cumbersome, but allows the user flexibility in calculating percentages.

The following is an explanation of the method for setting the percentage flags found on LINE 15. Figure A-1 is a portion of the input data set and will be used to explain the process for setting the flags. The columns of data have been labeled with the letters A - H to facilitate the discussion. These eight columns also represent the sets of data that are associated with the eight headings input in LINES 5 - 12. The data input (Figure 2) for LINE 15 in the example chart will also be used in the discussion.

A	B	C	D	E	F	G	H	
0	0	0	2	0	0	2	2	(LINE 15)

The zeros in positions A, B, C, E, and F tell the SDCNCC code not to perform any percentage calculations for that heading. The numbers in positions D, G, and H flag the code to calculate a percentage for that code, and the value of the number tells the code what number to use in the calculation.

The percentage that was plotted on the chart for ACTUAL OBLIGATION (position D) was flagged by the following process:

The 4th column of data (Column D, Figure A-1) is used because the flag is in the 4th position. The program then uses the last non-negative number in that column (45.0) to be the numerator in the percentage calculation. The program then uses 46.1, the value of flag (2) to find the denominator. This number is on the same row as the numerator (AUG data row) that is in the 2nd column (Column B). The percentage (98%) is calculated by the program and plotted by the 4th heading on the chart (ACTUAL OBLIGATION).

The following is the process for setting the flag:

a. The data set for which the percentage is to be calculated is flagged by putting a value of 1 - 8 in the position associated with the heading in LINES 5 - 12. A number is put in the first position (Position A) if a percentage is to be calculated using the first column of numbers. A number is input into the 2nd position (Position B) if a percentage is to be calculated using the data in the 2nd column. This is the process for all eight positions. The code will then use the last non-negative entry in that column as the numerator.

b. The number to be used as the denominator in the calculation is then selected by setting the flag in the chosen position. The user choses the denominator from the other data values that are contained in the same row as the numerator. The position in the row of the chosen denominator becomes the number for the flag. If the number to be used as the denominator is in the 3rd position (Column C) of the data set, the flag is then 3.

```
  A       B       C       D       E       F       G       H
OCT
56.0 ,   3.6 ,   1.0 ,   1.0 ,   1.0 ,   0.6 ,   0.0 ,   0.0
NOV
56.0 ,   4.1 ,   3.0 ,   3.0 ,   2.5 ,   1.1 ,   0.0 ,   0.0
DEC
56.0 ,  11.1 ,   3.5 ,   4.4 ,   3.0 ,   1.1 ,   0.5 ,   0.0
JAN
56.0 ,  21.1 ,   9.5 ,   8.7 ,   7.0 ,   7.5 ,   1.0 ,   0.5
FEB
56.0 ,  56.0 ,  18.5 ,  19.8 ,  13.5 ,  11.8 ,   6.5 ,   1.0
MAR
56.0 ,  56.0 ,  43.0 ,  40.4 ,  18.5 ,  17.3 ,   8.5 ,   1.4
APR
48.0 ,  48.0 ,  43.0 ,  41.6 ,  24.5 ,  23.4 ,  12.5 ,   3.8
MAY
48.0 ,  48.0 ,  44.0 ,  41.5 ,  31.0 ,  29.8 ,  13.5 ,   6.8
JUN
46.5 ,  46.5 ,  41.7 ,  42.8 ,  35.0 ,  34.1 ,  17.0 ,  13.1
JUL
46.5 ,  46.5 ,  45.3 ,  44.7 ,  38.5 ,  39.3 ,  21.0 ,  18.9
AUG
46.1 ,  46.1 ,  45.6 ,  45.0 ,  43.0 ,  43.6 ,  24.5 ,  20.7
SEP
46.1 ,  -10. ,  45.6 ,  -10. ,  45.6 ,  -10. ,  27.8 ,  -10.
```

Figure A-1. Data portion of input file project data.

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